View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Lincoln University Research Archive

The Intensification of Pastoral Agriculture: some trends and implications.

Keith Woodford
Professor of Farm Management and Agribusiness
Lincoln University

Published in Primary Industry Management, Vol 9, No2, June 2006, pp3-4

In the 15 year period starting 1990 there has been a remarkable transformation of New Zealand's pastoral agriculture. Dairy production measured as kilograms of milksolids has doubled. On sheep farms the number of ewes has decreased by one third yet tonnes of lamb meat production has increased by more than 10%.

Those of us working as professionals in the pastoral industries think we know something about why these outcomes have been achieved. In part it has been due to considerable genetic improvement in both sheep and dairy cattle. In part it has been due to greater understanding as to the importance of feed with high metabolisble energy, and how this quality is influenced by grazing management. In part it has come from increased irrigation. In part it has been due to the commercialisation of technologies such as ultrasound scanning of ewes which has opened up new management strategies. In part it has been new pasture varieties including those with AR1^{TM} endophytes.

But much of the increased production has also come from intensification of our pastoral systems. Quite simply we are putting on a lot more fertiliser, not only per hectare, per cow and per stock unit, but also per unit of output. It seems that we have also increased considerably the animal health and purchased feed inputs, once again not only per hectare but also per unit of output.

A Benign Environment

Recent changes, particularly in the last six years, have been driven by cost/price ratios that have been favourable.

Conventional wisdom says that in real terms (i.e. after allowing for inflation) product prices for farm commodities decline over time. However, in the last 15 years that has not been the case. For dairy product prices there has been considerable volatility but no convincing evidence of an overall trend in either direction. In the case of lamb there has been a very clear trend, only reversed at the end of 2005, of increasing prices, both in nominal and real terms.

What has often been quietly forgotten is that we have also been in an environment where the price of key farm inputs has been going up at less than the rate of general inflation. Between 1990 and 2005, fertiliser costs as measured by the Meat and Wool New Zealand Economic Service actually declined by 6%, whereas consumer price inflation over that

period totalled 38%. Total sheep farm costs over the period went up by 14% but this is still considerably less than the 38% increase for consumer prices.

In the case of dairy farms, data from the NZ Dept of Statistics farm costs series show an increase of about 27% from 1990 through to 2004, but the key input of fertiliser went up in price by only 4%. (The difference between dairy farm and sheep farm movements in fertiliser costs is a function of different fertiliser types. The major reason that the overall prices increases are greater for dairy than sheep is that the dairy index, unlike the sheep index, does not include interest costs, which decreased during the period because of declining interest rates).

When some time in the future we look back at the first six years of this century we will probably marvel at what a benign time it was for farming. Product prices, farm costs, and interest rates were all moving in the right direction, albeit with some level of volatility. Regulatory restrictions on nutrient management were minimal. For mainstream farmers, focusing on milk and meat, it was hard not to make money.

Intensification and the changing mix

Data collected as part of the Annual Sheep and Beef Farm Survey undertaken by the Meat and Wool New Zealand Economic Service shows that fertiliser per stock unit of meat has more than doubled over the 15 year period (Table 1). Of course a stock unit produces a lot more lamb meat in 2005 than it did back in 1990 on account of lambing percentages and lamb weights both increasing more than 20%. Nevertheless, this still means that in the years since 2000 the fertiliser inputs per kg of lamb meat have been about 60% more than 1990 and about 35% above that in the mid 1990s. In similar vein, information derived from the Dexcel Economic Survey of New Zealand Dairy Farmers indicates that fertiliser inputs per kg milksolids were nearly 40% higher in 2004 than in 1990. Some caution in relation to all of these figures is appropriate, in that the base year of 1990 happens to be a year of low inputs. However, the overall message seems to be clear that our pastoral systems now not only use a lot more fertiliser per hectare than in the past, but also use more fertiliser per unit of output.

Table 1 Sheep farm fertiliser inputs in kg per stock unit

1990/91 – 1991/92	9.7
1992/93 – 1999/2000	16.8
2000/01 – 2004/05	24.1

Source: Meat and Wool New Zealand Economic Service

Intensification has also lead to a change in the mix of farm expenses. Back in 1990 dairy farm expenditure on fertiliser, feed and grazing made up 33% of total farm expenses excluding interest and labour. By 2005 this had risen to 45%. On sheep farms, expenditure on animal health, fertiliser and feed increased from 17% to 26% of total expenses (including interest and labour).

The Economics and Politics of Intensification

With some of my colleagues I have been pondering on what are the best economic strategies if price ratios (product prices divided by input prices) continue to decline as we have seen in the last 12 months. A continuing decline is undoubtedly possible and perhaps likely. For a start, fuel and electricity prices are likely to continue rising at more than product prices. These increases will feed through into fertiliser costs because fertiliser manufacturing is energy intensive. Cartage costs, which have also been well contained in the last 15 years as a consequence of economic deregulation, can also be expected to increase.

If this occurs, then how should farmers respond?

Should they move back down the production curve by reducing inputs? Or should they further increase discretionary inputs so that the genuine fixed costs such as interest, depreciation, and administration are spread more widely? Which strategy will provide the lowest overall cost of production per unit of output? And which strategy will produce the highest profit? Perhaps most importantly, which strategy will best pay the bills?

The answers are not easy to provide. To some extent the answers will be farm specific. However, it is a fairly safe assumption that if current 2006 lamb prices are maintained then many sheep farmers will spend less on phosphate fertiliser. This will be driven by cash flow considerations, and also influenced by the fact that the returns from phosphate are somewhat lagged. However, the prospect of considerably greater use of nitrogen on sheep farms, despite declining price ratios, is definitely a possibility. Application of nitrogen will probably remain the cheapest way of remedying a feed shortage in late autumn and early spring.

Some preliminary calculations I have done for dairy farms, using linear programming, suggest that for a milksolids price of about $4 per kg, the value of each additional kg of feed from autumn through to spring can be worth about 30cents when used tactically to deal with a feed shortage, and about 20 cents when used as part of the overall strategic feed plan for these periods. This means that even if the price of nitrogen fertiliser increases significantly, then as long as each kg of N is producing an extra 10kg of good quality feed, there is economic justification for applying more nitrogen.

Accordingly, on many dairy farms and also possibly on some sheep operations, the constraints on further increases in fertiliser quantities, particularly nitrogen, are likely to be environmental rather than economic. This is going to create political pressures.

One of my farmer friends, who at times has an alternative view of events, has been trying to educate me in relation to how farmer politics works. He tells me it is very simple. “As farmers we should be able to do what we like. And someone else should pay”. Well, in relation to nutrient management there is an element of truth in this perspective as a description of what has been happening. Farmers have been free to do what they wanted,

and the environmental costs have been borne beyond the farm. In future it seems unlikely to be that simple.

In future we are going to have to pay a lot more attention to both the economics and politics of intensification. Major questions have to be asked as to whether we have adequate decision tools for either the economic or nutrient management analyses.

In regard to the economics there is considerable doubt as to whether trying to apply the fundamental principle of putting on fertiliser until marginal revenue equals marginal cost will lead to good decisions. The problem is not with the principle, but with the difficulty of getting the right answer within a gross margin or other partial analysis framework. Fertiliser is such an important driver within the system that when fertiliser usage changes many of the other inputs also change and this can only be captured with whole farm analyses. We still have some way to go before more sophisticated computer based decision aids become standard tools within our profession.

There are also important questions that have to be asked in relation to nutrient management profiling, and the way in which any regulations should be set. Any restrictions based on stocking rates will inevitably be inefficient. Similarly, any restrictions based on the gross amount of nutrient supplied will be an inefficient indicator of the amount of nutrient being leached. Also, if we are going to use decision support tools such as Overseer then there will need to be total transparency as to the underlying assumptions, combined with confidence that these assumptions lead to accurate answers across various soil types. The incorporation of nitrification inhibitors within our nutrient management strategies would seem to be of considerable importance.

Perhaps the most important question for farm management and agribusiness professionals in relation to nutrient management strategies is the extent to which we should take a proactive or reactive role. There can be little doubt that nutrient management strategies will become increasingly important. The question therefore is where and how we want to position ourselves in relation to these strategies, to ensure that farmers retain the right to do what they want, as long as no-one else has to pay.

****

Acknowledgements: The task of trying to tease out the intensification story was facilitated by access to spreadsheet data from both the Meat and Wool New Zealand Economic Service and the Dexcel Economic Survey of New Zealand Dairy Farmers. Neither organisation has any responsibility for the interpretations I have drawn.